2017 COASTAL MASTER PLAN | APPENDIX B:

PEOPLE AND THE LANDSCAPE

COASTAL PROTECTION AND RESTORATION AUTHORITY
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SUMMARY OF APPENDIX

Appendix B: People and the Landscape reviews the 2017 Coastal Master Plan as it relates to Louisiana's coastal residents. The appendix includes discussions of land loss in a future without action, insurance issues, population shifts, and what the proposed projects in the Master Plan might deliver to residents, in terms of land building as well as reductions in flood risk. The appendix also provides an overview of CPRA's Flood Risk and Resilience Program, as well as information on new economic opportunities driven by the coast. The appendix ends with a summary of south Louisiana's significance to the nation. This information can be used by coastal residents, local parish leaders, and others looking for a non-technical summary of master plan themes and findings.

Photo courtesy of U.S. Army Corps of Engineers.

COASTAL PROTECTION AND RESTORATION AUTHORITY

This document was prepared in support of the 2017 Coastal Master Plan by the Coastal Protection and Restoration Authority (CPRA). CPRA was established by the Louisiana Legislature in response to Hurricanes Katrina and Rita through Act 8 of the First Extraordinary Session of 2005. Act 8 of the First Extraordinary Session of 2005 expanded the membership, duties and responsibilities of CPRA and charged the new authority to develop and implement a comprehensive coastal protection plan, consisting of a master plan (revised every five years) and an annual plan. CPRA's mandate is to develop, implement and enforce a comprehensive coastal protection and restoration master plan.

ACKNOWLEDGEMENTS

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Coastal resident of Grand Isle. Photo courtesy of Louisiana Sea Grant.

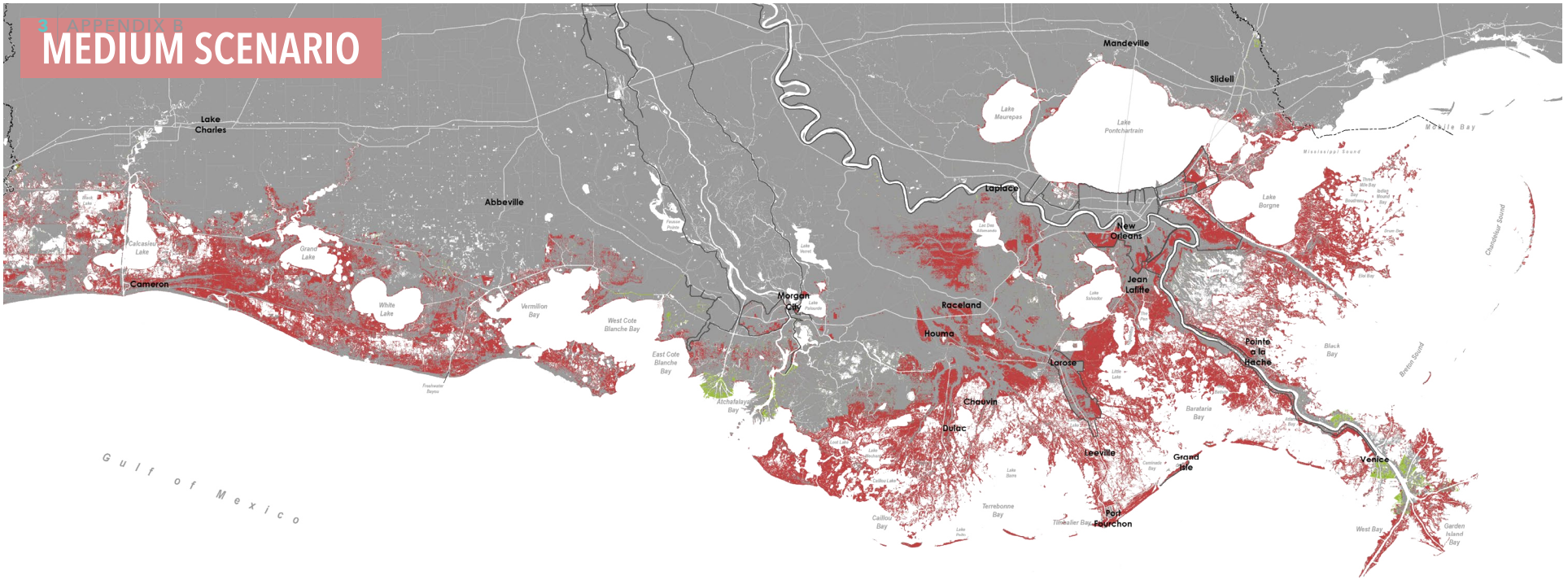
PEOPLE AT THE CENTER

What does the future look like? Will my home flood? Can our coast survive? These are the questions CPRA heard over the last few years, as we traveled south Louisiana and listened to hundreds of residents. We also heard about people's love for landscapes at the heart of proud communities. For all of its technical detail, Louisiana's 2017 Coastal Master Plan is about these questions, these communities, and this pride. Simply put, the master plan is about people—and how they and the land can both thrive.

This appendix sums up what we have learned about the coast, and what that means for the people of south Louisiana. We also discuss how our coast affects our national economy. Other master plan chapters and appendices present details about the challenge facing south Louisiana, explanations of how the plan was developed, and in depth discussion of proposed projects. Taken together, the many parts of the master plan provide ideas for a better future.

We know our coast is unlike any other and that our future is linked to the land. The master plan offers ways to renew the contract between our coast and all who depend on it.

MEDIUM SCENARIO



HIGH SCENARIO

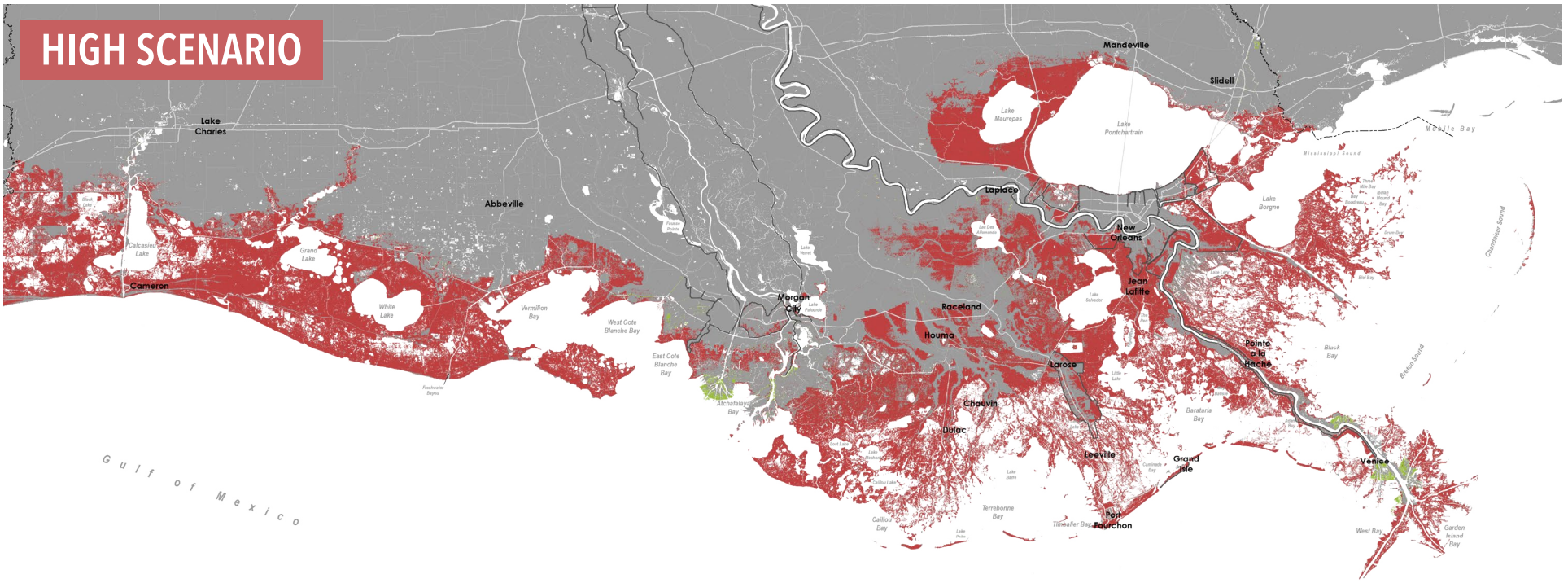


FIGURE 1. PREDICTED LAND CHANGE - IN 50 YEARS, MEDIUM SCENARIO

What south Louisiana will look like if we do not build any master plan projects, and sea level increases by 2.07 feet. Red indicates wetlands that will likely convert to water in the next 50 years, a total of 2,250 square miles. Green indicates new areas of wetland growth.

FIGURE 2. PREDICTED LAND CHANGE - IN 50 YEARS, HIGH SCENARIO

What south Louisiana will look like if we do not build any master plan projects, and sea level increases by 2.72 feet. Red indicates wetlands that will likely convert to water in the next 50 years, a total of 4,100 square miles. Green indicates new areas of wetland growth.

LAND IS DISAPPEARING, WATER IS RISING, AND COMMUNITIES ARE CHANGING AS A RESULT.

THE FUTURE WITHOUT ACTION

LOSING LAND, WATCHING WATER

Every day in south Louisiana, people wonder how land loss and flooding will affect them. From worries about insurance, to questions about whether to move themselves or elderly relatives, coastal residents see change coming, and they are worried. These maps were created as part of the master plan analysis, and they confirm people's concerns. Land is disappearing, water is rising, and communities are changing as a result.

These estimates show more land loss than we had predicted in the 2012 plan. The primary reason? As scientists study climate change worldwide, they have steadily increased their estimate of how much sea level will rise in the next decades. There are many variables to consider when applying these global estimates to Louisiana. However, the upward trend for sea level rise is clear, and it was crucial to our analysis.

We examined many factors when creating these maps, from estimates for sea level rise, to subsidence rates, to hurricane frequency and intensity. The goal was to understand the best available science and then give coastal residents some answers about what to expect. For example, we've lost 1,800 square miles of land in Louisiana since the 1930s. We now know that we stand to lose anywhere from 1,200 to 4,100 more square miles in the next 50 years if we do nothing further to address the coastal crisis. Not surprisingly, flooding is expected to worsen significantly over the next 50 years.

But along with the bad news comes some good: we do not see big increases in land loss or flood depths for another two decades or so. This gives coastal residents time to consider the best options for their families and businesses. It also gives us time to help communities at greatest risk adapt or find funding for relocation efforts.

Residents of Lake Charles, Louisiana carry relief supplies to family members after Hurricane Ike. Photo courtesy of Chuck Simmins.

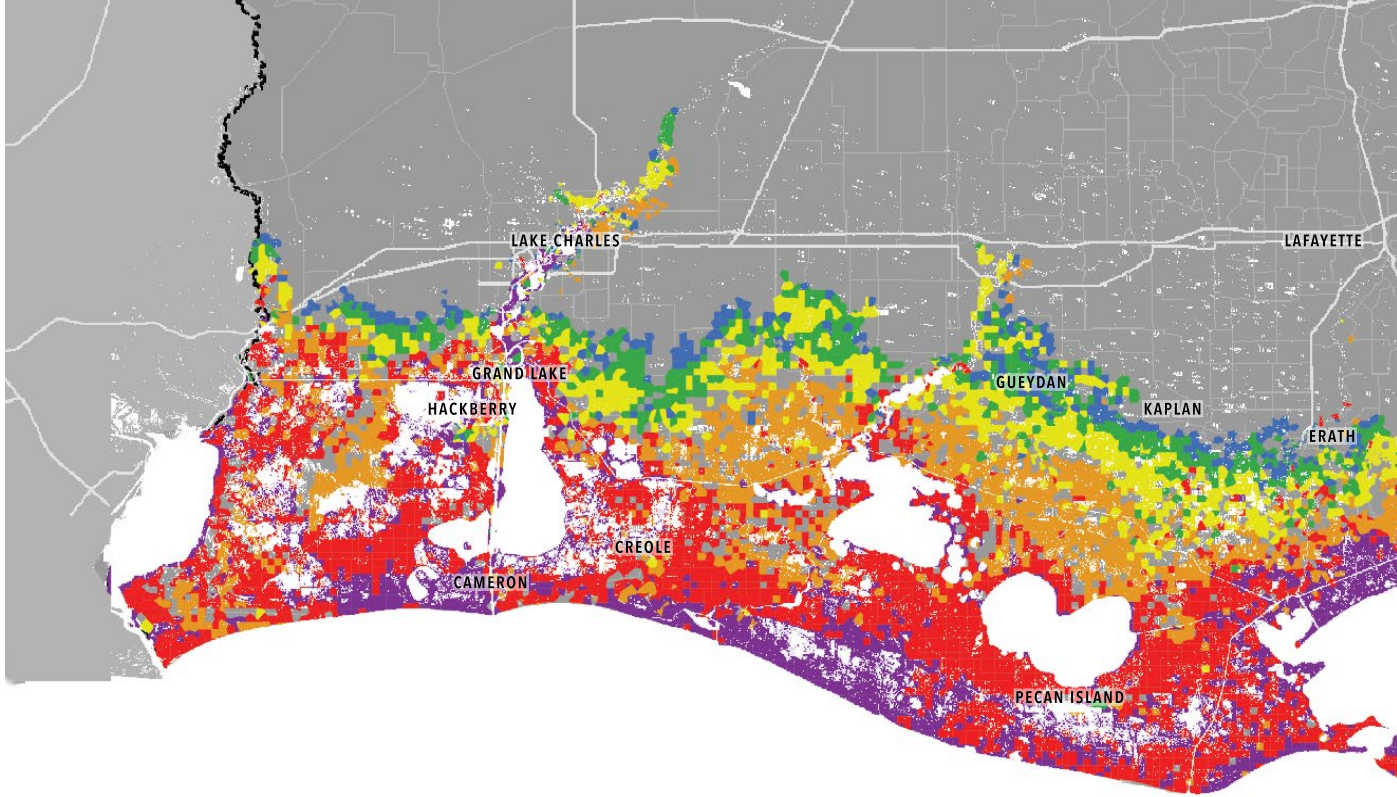
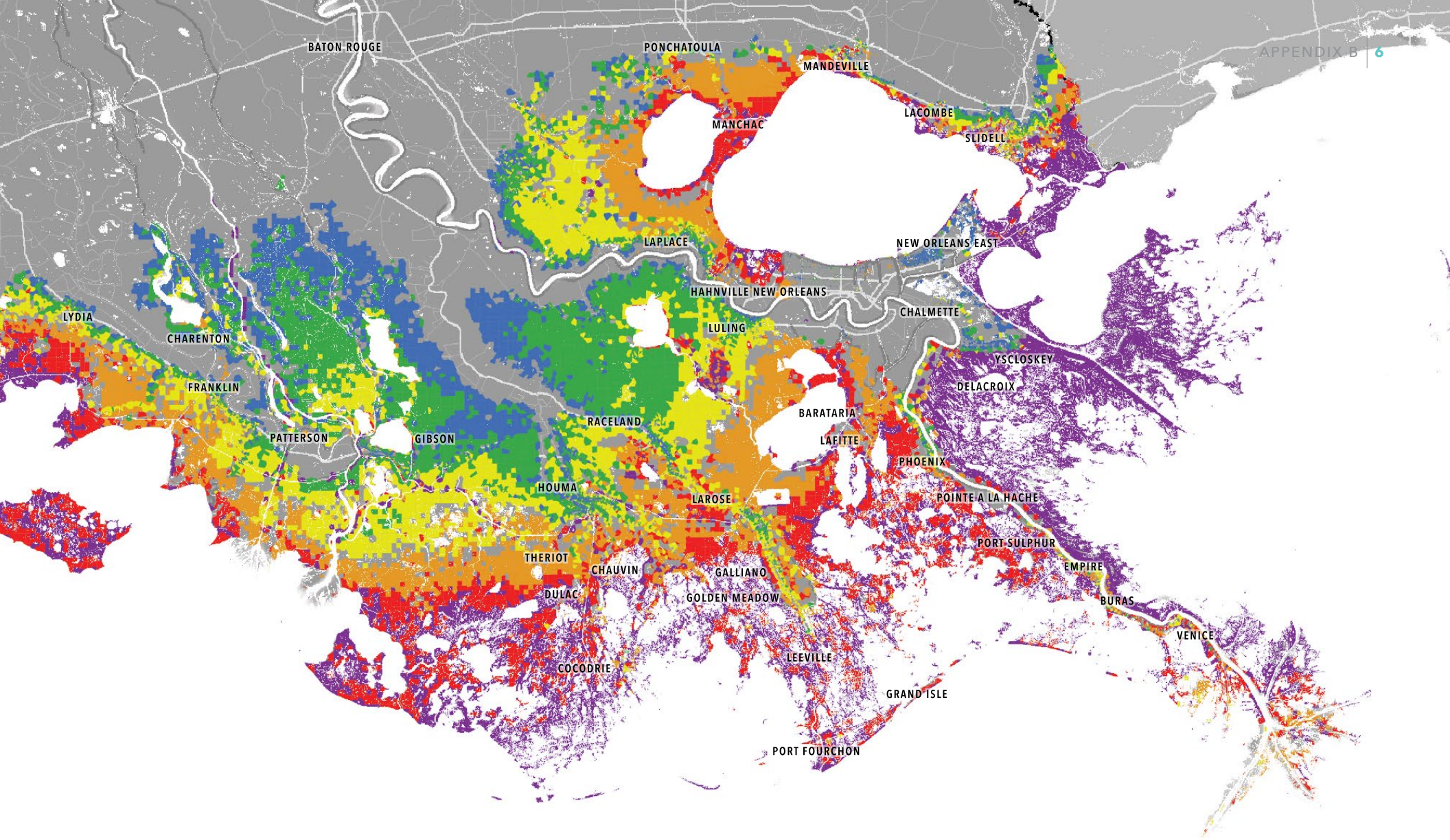


FIGURE 3. FLOOD DEPTHS FROM STORM SURGE

This map shows flood depths 50 years from now under the medium environmental scenario, assuming we take no further action to reduce risks. Our estimates show these flood levels occurring as a result of a 100 year storm, meaning a storm that has a 1% chance of occurring in any given year. Under these conditions, the City of Houma could receive 5 to 9 feet of flooding; Lafitte could receive 10 to 15 feet of flooding; and Cameron could receive over 15 feet of flooding. In addition, we estimate that annual damage from storm surge based flooding events could be over seven times greater in a future without action. Future flood depths will vary throughout the coast. To see estimates of what your flood risk would be with and without master plan projects, use the Master Plan Data Viewer available at: cims.coastal.louisiana.gov/masterplan.



LESS FLOODING — MORE FLOODING

1′ - 3′ | 4′ - 6′ | 7′ - 9′ | 10′ - 12′ | 13′ - 15′ | > 16′

FLOOD DEPTHS FROM STORM SURGE
IN 50 YEARS

IT'S NOT JUST HURRICANES

Hurricanes grab headlines and rightly so. But low-lying Louisiana communities are also affected by weather fronts and high tides. The resulting high water floods roads, homes, and businesses, disrupting life not just once every few years, but many times a year. These nuisance floods will increase as our coast degrades and sea levels rise.

Although the outlook appears bleak, there is time for residents of these communities to plan for the future. Some communities may decide to move, as the residents of the Isle de Jean Charles have done. If other communities decide this is a good option for them, we will all have to work together—residents, state and local agencies, and funders—to decide how relocation should happen. For example, CPRA can share detailed information on risk through its Master Plan Data Viewer and meet with communities to explain what our projections tell us about future trends. CPRA's Flood Risk and Resilience Program can also offer guidance about next steps.

In 2017, the Office of Community Development's LA SAFE Program will be working with six coastal parishes: Terrebonne, Lafourche, Plaquemines, Jefferson, St. John the Baptist, and St. Tammany. The program's goal is to help communities at particular risk of flooding take stock of their options. Each community will create a resilience plan that takes the latest science into account while also being people focused and respectful of tradition. Once each community has a resilience plan, it can work with the LA SAFE Program and other state partners to bring its ideas to fruition.

FLOOD RISKS AT THE LAND/WATER BOUNDARY

25-year time horizon, assuming a future without action and the medium scenario for sea level rise: Ten communities will be particularly vulnerable to nuisance flooding in the next 25 years, not counting effects from future hurricane damage: Cocodrie; Delacroix; Grand Isle; Isle de Jean Charles; Kraemer, Lafitte/Crown Point/Barataria; Leeville; Lower Pointe aux Chenes; Paradis; and Venice.

50-year time horizon assuming a future without action and the medium scenario for sea level rise: For 11 communities, nuisance flooding will bring dramatic change over the next five decades. Such flooding will be high enough to make daily life next to impossible, even without future hurricane damage. These communities include: Cocodrie; Delacroix; Dulac; Grand Isle; Isle de Jean Charles; Kraemer; Lafitte/Crown Point/ Barataria; Leeville; Lower Pointe aux Chenes; Paradis; and Venice.

THERE IS TIME FOR RESIDENTS OF HARD HIT COMMUNITIES TO PLAN FOR THE FUTURE.

Flooding is a fact of life in south Louisiana. Photo courtesy of Pixabay.

THE INSURANCE CHALLENGE

HIGH PRICES, HIGH RISK

The National Flood Insurance Program (NFIP) is struggling, and coastal Louisiana residents are feeling the pinch. Until Hurricane Katrina and subsequent storms, the NFIP offered a way to insure high risk property from flooding. Owners paid premiums to the federal government, and that money was used to help people rebuild after flooding disasters.

But in the last decade, the NFIP began spending more on rebuilding than it was collecting in premiums. Enter the federal Biggert-Waters Act of 2012, which was designed to shore up the NFIP by increasing national flood insurance premiums. After thousands of people across the U.S. received huge premium increases, Congress passed the Homeowners Insurance Affordability Act of 2014. While this act softened parts of Biggert-Waters and returned some stability to premium prices, the issue is not resolved. Biggert-Waters is up for reauthorization in 2017, and we should expect continued spikes in the cost of flood insurance.

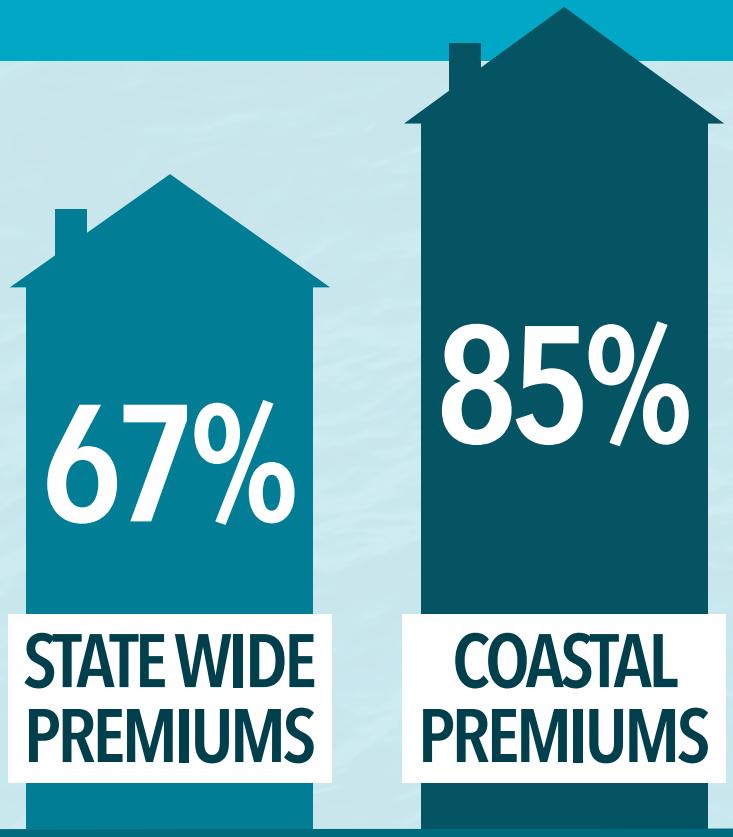
Louisiana residents are already paying high premiums for flood insurance, with increases of 85% and higher in coastal areas between 2004 and 2015. In St. John the Baptist Parish, premiums increased 109% between 2005 and 2015, the highest increases in the state. In some cases, the increases have been so high that people choose to go without insurance; the number of government sponsored flood insurance policies dropped 10% in Louisiana between 2009 and 2015. Experts now estimate that 70-80% of coastal residents may not have federal flood insurance. Canceling expensive flood insurance may make sense in the short-term, but it leaves residents vulnerable when the next disaster strikes.

FIGURE 4. RESIDENTIAL RISK AND INSURANCE PREMIUM INCREASES

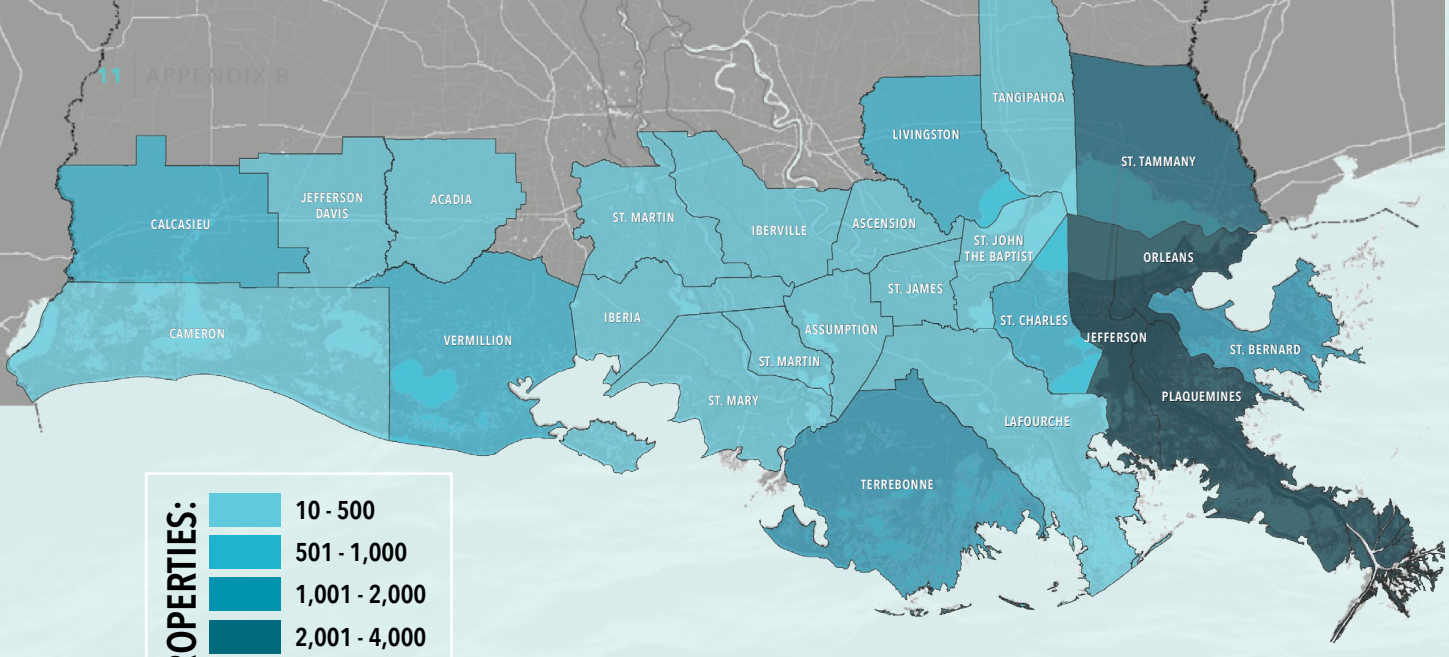
Hurricane storm surge is only one kind of flooding that south Louisiana endures. Weather fronts and high tides also bring high water to Louisiana communities many times a year. But even if we look just at hurricanes, we've seen a strong increase in the risk to residential property. The National Flood Insurance Program (NFIP) is a federal program that offers insurance to areas where private insurance is unavailable or hard to find. Recent storms have sent NFIP premiums soaring.

LOUISIANA IS IN THE TOP 5 STATES FOR RESIDENTIAL EXPOSURE TO HURRICANE STORM DAMAGE

TOTAL EXPOSURE: $72B [2013]



INCREASE IN HOMEOWNER PREMIUMS FROM 2004-2015



LOUISIANA PARISHES AND COMMUNITIES

TAKE 8

OF THE TOP 25 SPOTS IN THE U.S. FOR REPETITIVE FLOOD LOSS

STATES WITH HIGHEST REPETITIVE FLOOD LOSSES 1978-2015

COAST WIDE TOTAL NFIP CLAIMS PAID:

$16B SINCE 1978

SINCE 1995 7 OF THE TOP 10 NFIP PAYOUTS DUE TO FLOOD EVENTS INCLUDE LOUISIANA

FIGURE 5. REPETITIVE FLOOD LOSS

The number of repetitive loss claims filed per parish. Jefferson Parish shows the most claims filed. These statistics apply only to those who have flood insurance through the National Federal Insurance Program (NFIP). This group is a minority; approximately 70-80% of all coastal homeowners do not have flood insurance. Being uninsured is not always a matter of choice in south Louisiana. NFIP rates are rising, and private flood insurance is almost impossible to obtain.

CHANGING THE STATUS QUO

According to the Insurance Information Institute, Louisiana is among the top five states for exposure to flood risk. We flood more, so we file more claims, including repeated claims for properties that flood again and again. When a household or business files multiple flood claims for the same property, the insurance industry calls this a repetitive loss.

Repetitive losses are expensive for everybody, and Louisiana leads the nation in the number of repetitive loss insurance claims submitted. That is one big reason why our state's flood insurance rates are so high. As their insurance bills take an ever larger bite of their budgets, even outpacing mortgage payments in some cases, homeowners face a tough choice: either pay expensive premiums or opt out of insurance. For people seeking to buy property or open a new business, the cost of flood insurance can halt otherwise promising transactions.

To remain economically vital, coastal residents need access to affordable flood insurance, property and casualty insurance, business interruption insurance, and crop insurance. Mortgage loans require insurance, as do local governments when they issue bonds to finance operations. Without reliable access to insurance, communities won't be able to maintain their tax and employment bases.

The issue is not just about dollars and cents. When a home or business floods, people suffer. They lose family treasures, they lose sleep, and they lose precious time trying to get back to a starting point that is threatened by each new flood. Even when there's a respite from disaster, coastal residents have to live with the question of whether they and their homes will be safe in the long run.

Given the high financial and human cost of repetitive losses, as well as the number of people who do not have federal flood insurance through the National Flood Insurance Program, it's time to rethink how coastal residents and businesses protect themselves from flooding. That is where CPRA's Flood Risk and Resilience Program comes in. This program will offer information and incentives to parishes that want to elevate homes, floodproof businesses, or consider voluntary acquisition. The program also helps homeowners learn how much flooding they can expect and what to do about it. Being informed about the risk and taking action to lower that risk can reduce insurance premiums and give homeowners more peace of mind.

ADAPTING TO CHANGE

CHALLENGING CONVENTIONAL WISDOM

With flooding risks and insurance premiums both going up, it is not surprising that some coastal residents are moving. The map at right includes the effects of Hurricanes Katrina, Rita, Ike, and Gustav. It shows a clear trend: hundreds of people are heading north, along with their businesses and their tax dollars. This trend is most evident in low lying areas of St. Bernard, Plaquemines, Terrebonne, and Cameron Parishes. While some of these changes could be accounted for by recent disasters, no one expects a return surge of population in many of the coast's southernmost communities.

Recent shifts in population pose questions about a traditional assumption: that the residents of south Louisiana have always moved with the changing coast and will continue to do so as they weather current challenges. It's true that south Louisianans are moving to avoid flooding as they always have, but doing so today is a different proposition than it was 100 or even 50 years ago. Needs for roads, fiber optics, and other built infrastructure are not quickly met. As a result, people are moving to areas that might not be ready for them. Increases in traffic, needs for road improvements, and a lack of affordable housing are all problems that expanding communities and their new arrivals wrestle with.

Louisianans used to believe that moving north meant moving to higher ground, but that assumption is also being proved false. Flood risks may already exist in communities that are expanding. These risks can be made worse depending on how new development proceeds. For example, people might move to an area behind a levee, assuming that they will be protected from flooding. That assumption can lead to unwarranted confidence. Without careful planning, it becomes easy to default to building practices, such as slab on grade housing, which put people and businesses at risk even if a levee is nearby. New Orleans' experience with levee failures during Hurricane Katrina illustrated the danger of this practice.

FIGURE 6. HISTORICAL POPULATION CHANGE OVER TIME

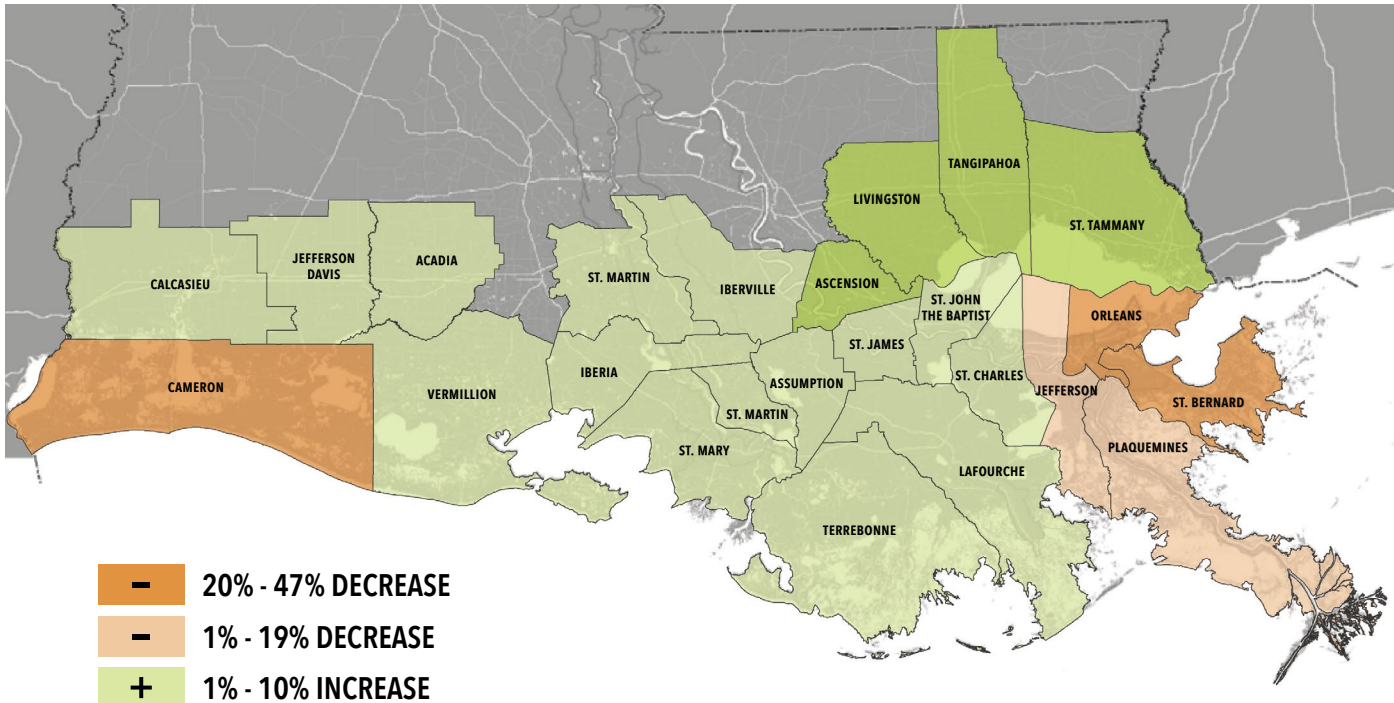
Cameron, Orleans, and St. Bernard Parishes lost the largest percentage of residents between 2000 and 2010. The Northshore and Ascension Parish gained the largest percentage of residents. The central coast saw a small but steady population shift. This map is based on US Census data from 2000 and 2010.

Louisiana Sea Grant extension agent dockside in Intracoastal City. Photo courtesy of Louisiana Sea Grant.

HELP WITH NEXT STEPS

All of these changes—land loss, storm surge, nuisance flooding, rising insurance costs, and people moving—are hard on south Louisiana families and business owners. The issues are urgent, and there are no easy answers. However, two factors do offer some solace. The first is time: coastal residents can explore their options now and make considered decisions about how they will weather these trends in years to come.

Secondly, there is help for people who aren't sure what to do. CPRA can discuss in more detail what the science says about land loss and future flooding risk. In addition, the Office of Community Development's LA SAFE program can provide more structured advice about options, funding, and next steps. In other words, coastal residents aren't alone as they confront a changing coast.



COASTAL PARISH POPULATION CHANGE

SECTION TWO

WHAT THE MASTER PLAN MEANS FOR COMMUNITIES

- BUILDING LAND
- REDUCING FLOOD RISK
- OTHER PLAN BENEFITS

Marsh Maneuvers student uses a cast net to collect fish samples. Photo courtesy of Louisiana Sea Grant.

LISTENING AND LEARNING

South Louisiana residents are facing enormous changes. Because people are making decisions about their families, their jobs, and their futures, they need details about what to expect. To meet these needs, the 2017 Coastal Master Plan identifies the projects our state should build, as well as information about results: how much land can be built or maintained, as well as details about which communities will be most vulnerable to flooding in future years.

We can't predict exactly how our coast will change. Future increases in climate change-induced sea level rise, for example, will force us to adjust. But based on what we know today, the projects in this plan will allow us to build land in crucial areas and reduce current and future flood depths, provided coastal residents work with state partners to prepare. We used the ballpark figure of $50 billion in today's dollars as a baseline against which to evaluate different options. This rough budget is split evenly between 45 flood risk reduction and 79 restoration projects.

Our recommendations spring from scientific research but also from listening to coastal residents who have generations of expertise to share. We incorporated these lessons when selecting projects for the 2017 Coastal Master Plan:

- **Make it practical.** The master plan must recommend projects that build land and reduce flooding, both now and in the long-term.
- **Certain projects are key.** No way around it—we have to use sediment diversions to build land in certain parts of the coast, or we risk ecosystem collapse. In the same way, levees have a place in reducing flood risk.
- **Use a mix of tools.** Levees aren't the only way to protect communities; in some areas, raising homes and floodproofing businesses are more effective strategies. Similarly, the master plan's sediment diversions are located near the Mississippi or Atchafalaya Rivers. Other regions require different approaches to land building. In all, the plan uses eight types of projects to build land and reduce flood risk.
- **We can't fix everything.** Some coastal residents will be able to live, work, and play in and around the coast for the foreseeable future. However, communities in particularly hard hit areas will have to adapt, with support from CPRA and its partner agencies.
- **These lessons are hard.** People want to know that their communities are being fully considered as decisions are made about projects and programs. Others worry that a particular project has strong downsides. To all of these people we say, "talk to us." We want to hear your concerns. Our mission is to keep listening and learning, and having conversations with coastal residents is part of our job. Attend a community forum or request that a staff member from CPRA come speak to your citizens' group. Email us at: masterplan@la.gov.

BUILDING LAND

THE DRIVE TO BUILD LAND

We talk so often in south Louisiana about losing wetlands and saving wetlands. When we do, we're not just discussing ways of moving sediment; we're talking about preserving a way of life. Many important businesses and industries are located in south Louisiana, and they provide thousands of jobs and services. But, important as these economic assets are, our bond to the land is deeper.

A father who remembers fishing in the local bayou wants to continue the tradition with his own children. A town that cherishes its history wants to remain a place where people work and raise families. People who enjoy south Louisiana's birding, hunting, and boating want those activities to keep being vital parts of their lives. Such desires show a deep appreciation for the landscape and a recognition that the coast's value goes beyond simple utility. This recognition is at the heart of our experience as south Louisianans, and it is this value we are called to sustain.

How do we get there? We use different land building strategies in different parts of the coast. In southeast Louisiana, we are combining river diversions with dredging projects to address high rates of wetland loss. In the central portion of the coast, we will rely on dredging, as well as the natural processes of the Atchafalaya River, to continue building land. In the southwest, our approach is defensive: restore wetlands where possible, while limiting saltwater intrusion. All of these strategies were dictated by facts on the ground: sea level and subsidence rates, whether there was available sediment for building land, and whether the soils in the region offer stable platforms for building projects.

We predict that the projects in the master plan can build or maintain 800 square miles of land over the next 50 years. For example, land area in the upper Barataria and Pontchartrain regions will be largely maintained. These results will not make up for what we've lost so far, and as the map shows, it will create a coast that looks much different from the one we have now. Some communities and residents will face real losses. But these projects represent the best way we know to sustain the landscape, its habitats, and the diverse ways we use the coast.

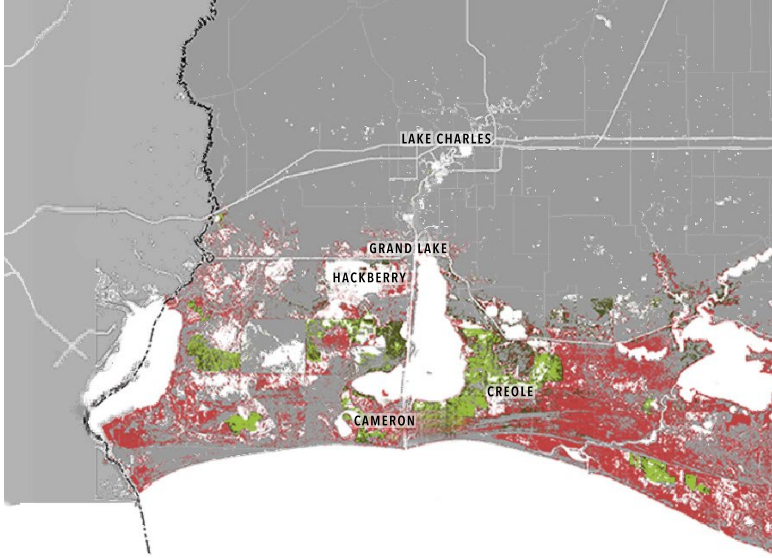
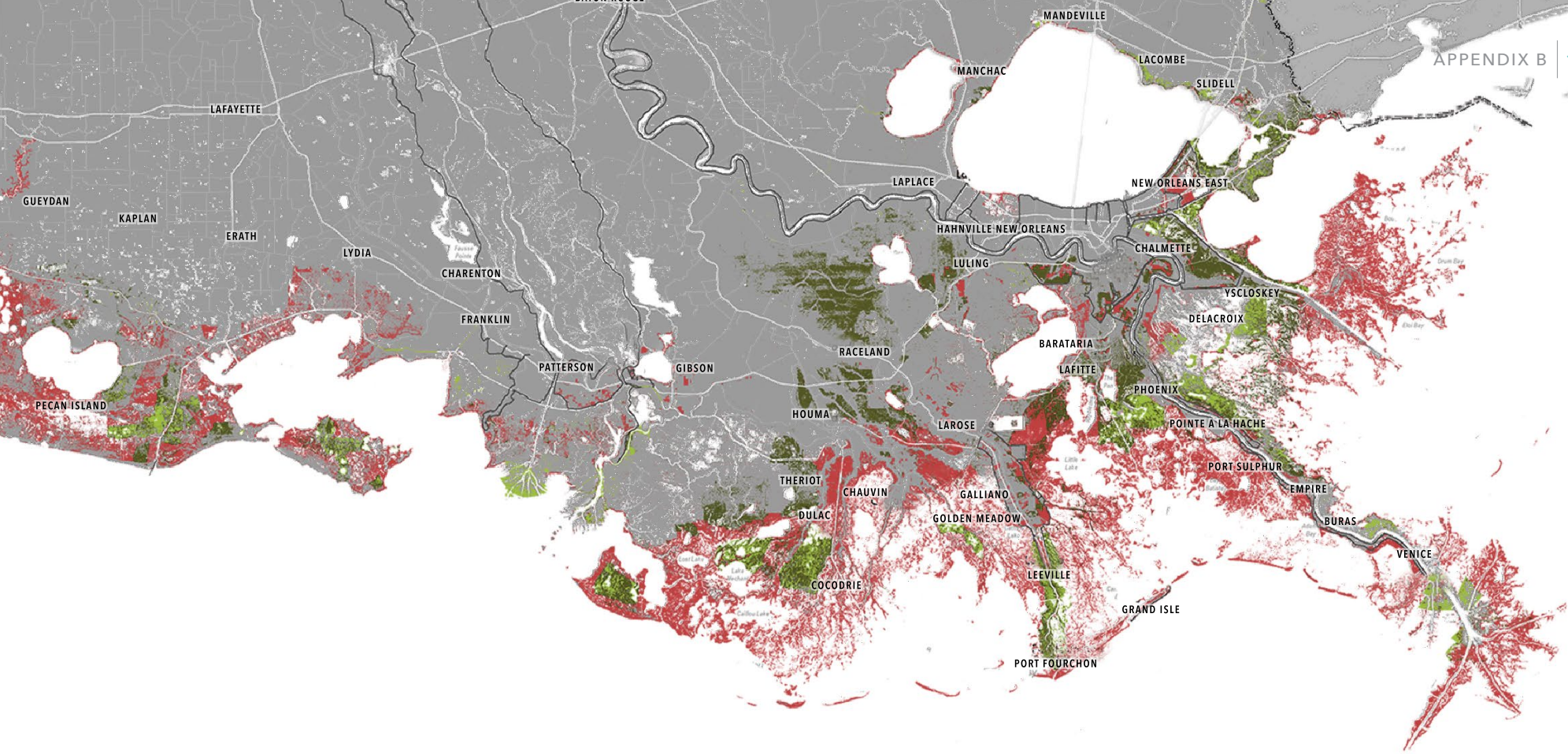


FIGURE 7. BUILDING LAND - IN 50 YEARS, MEDIUM SCENARIO

Compared to what would occur if we took no action, we predict that the master plan can help us build or maintain 800 square miles of land over the next 50 years. This estimate uses the medium environmental scenario. The built or maintained land will be located throughout the coast to provide benefits to people and wildlife. As the map also shows, we will continue to lose a substantial amount of land over the next 50 years, particularly in the Bird's Foot Delta, lower Barataria-Terrebonne, and the western coast—areas where combinations of different factors make land building difficult. Some of these factors include: high subsidence, sea level rise, and a lack of sustainable sources of land building sediment.

Fishing is a family tradition in south Louisiana. Photo courtesy of Pixabay.



LAND LOST
LAND GAINED
LAND SUSTAINED

BUILDING LAND
IN 50 YEARS

A FATHER WHO REMEMBERS FISHING IN THE LOCAL BAYOU WANTS TO CONTINUE THE TRADITION WITH HIS OWN CHILDREN.

SEDIMENT DIVERSIONS ARE ESSENTIAL TOOLS

By building land over the coming decades, sediment diversions will restore targeted wetland ecosystems and support the ways we use the coast. Diversions will be constructed with the needs of coastal residents in mind, while also safeguarding our navigation industry, the long-term health of fisheries, and other crucial activities. Of the 10 diversions proposed in the 2012 plan, two lower Mississippi River sediment diversions are currently moving forward: Mid-Barataria and Mid-Breton. It will take several years to design these projects and gain all of the permits needed for construction.

Our proposals for sediment diversions have spurred controversy. Commercial fishers worry that the diversions will hurt fisheries and kill oyster beds. While we understand these concerns, we believe the issue is not black or white; we can build land and maintain healthy fisheries. The diversions will be used carefully, only running at full steam when the Mississippi River is already high and flooding surrounding wetlands. We will also take fisheries into account when designing the projects. For example, at the future site of the Mid-Barataria project, CPRA's assessment and monitoring program is investigating baselines for water quality, including salinities, as well as other conditions that might affect fish. Such monitoring will continue as diversions are built and begin operation.

In November 2016, the National Fish and Wildlife Foundation awarded Louisiana $245 million. The funds came from criminal fines paid by BP and Transocean for their parts in the BP oil disaster. We will use these funds to begin engineering and design of the diversions mentioned above. We will also begin planning a project that will use increased Atchafalaya River flow to build and maintain wetlands in Terrebonne Parish, where land loss rates are extremely high.

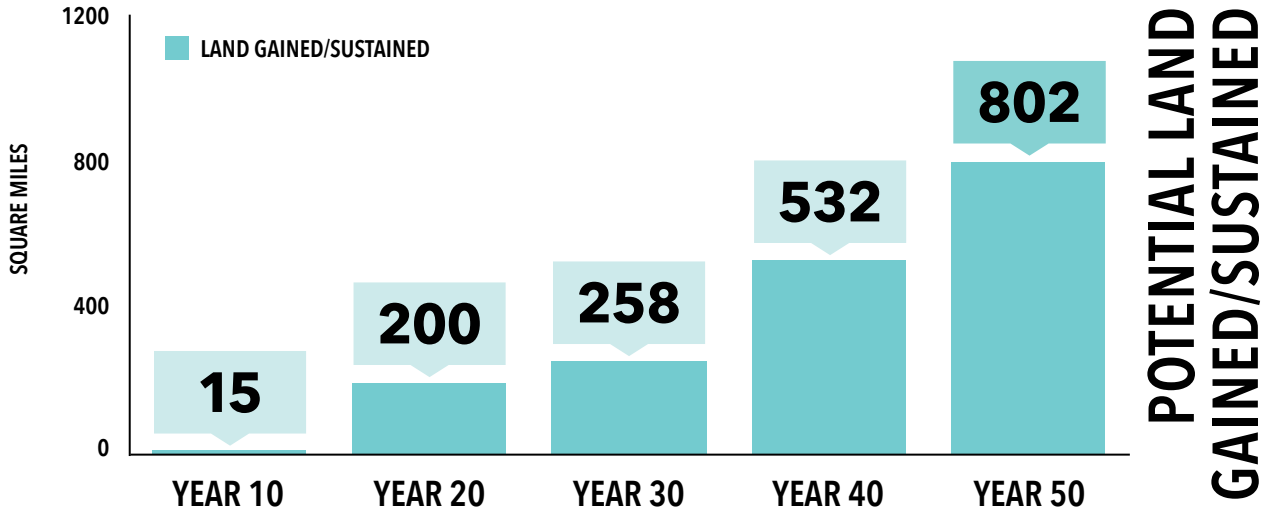


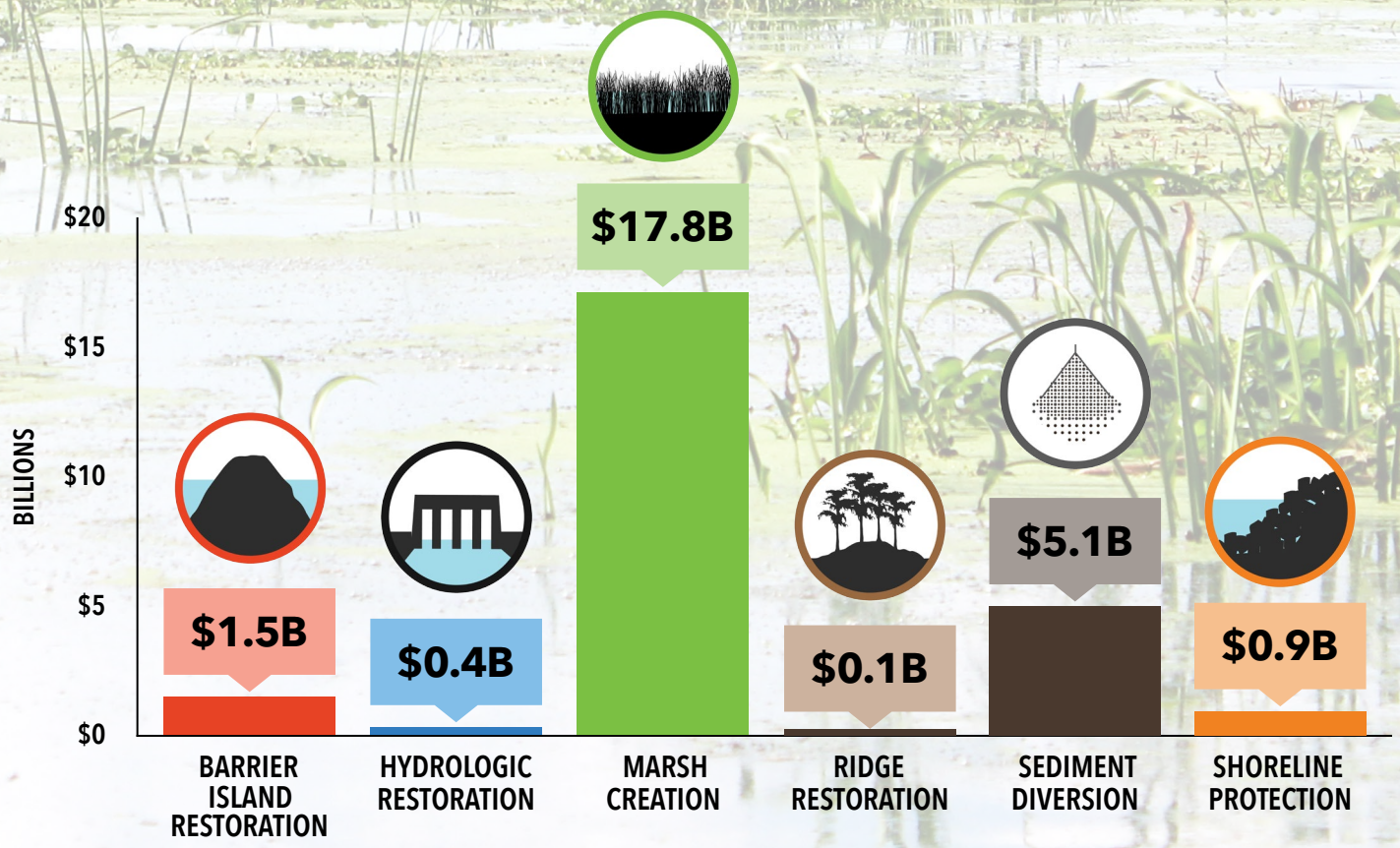
FIGURE 8. POTENTIAL LAND GAINED/ SUSTAINED - FUTURE WITH ACTION, MEDIUM SCENARIO

In 50 years, restoration projects in the 2017 Coastal Master Plan have the potential to conserve or create approximately 800 square miles of land under the Medium Environmental Scenario.

FIGURE 9. RESTORATION FUNDING BY PROJECT TYPE

The master plan uses six types of restoration projects to build land, at a projected total cost of $25 billion.

Photo courtesy of The Water Institute of the Gulf.



RESTORATION FUNDING BY PROJECT TYPE

REDUCING FLOOD RISK

RISK REDUCTIONS FOR COMMUNITIES

The master plan's projects will reduce flood risk between five and ten feet in some communities. These reductions will occur over the next 50 years and are compared to what would happen over the same period of time in a future without action. These communities include:

- Des Allemands
- Golden Meadow
- Highway 90 corridor from Delcambre to Franklin
- Houma
- LaPlace
- Larose

Examples of communities that will benefit from the master plan's structural protection projects include:

- Chackbay
- Des Allemands
- Houma
- Kraemer
- Lacombe
- Madisonville
- Mandeville
- New Orleans
- Ruddock
- Slidell

Examples of communities that will benefit from the master plan's nonstructural protection projects include:

- Cameron
- Chenier Plain
- Hackberry
- Houma
- Lafitte
- Lake Charles
- Lower Terrebonne
- Pecan Island
- Raceland
- St. Tammany
- Sulphur
- West banks of Plaquemines and St. Bernard Parishes

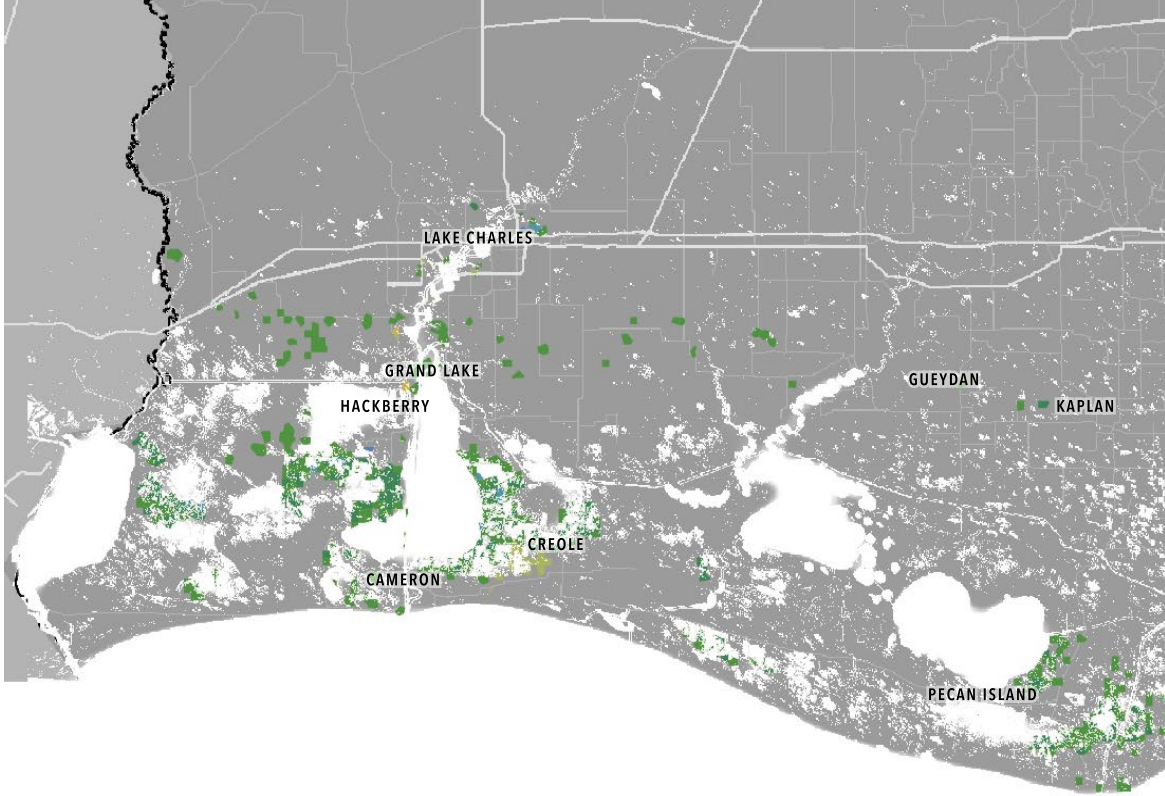
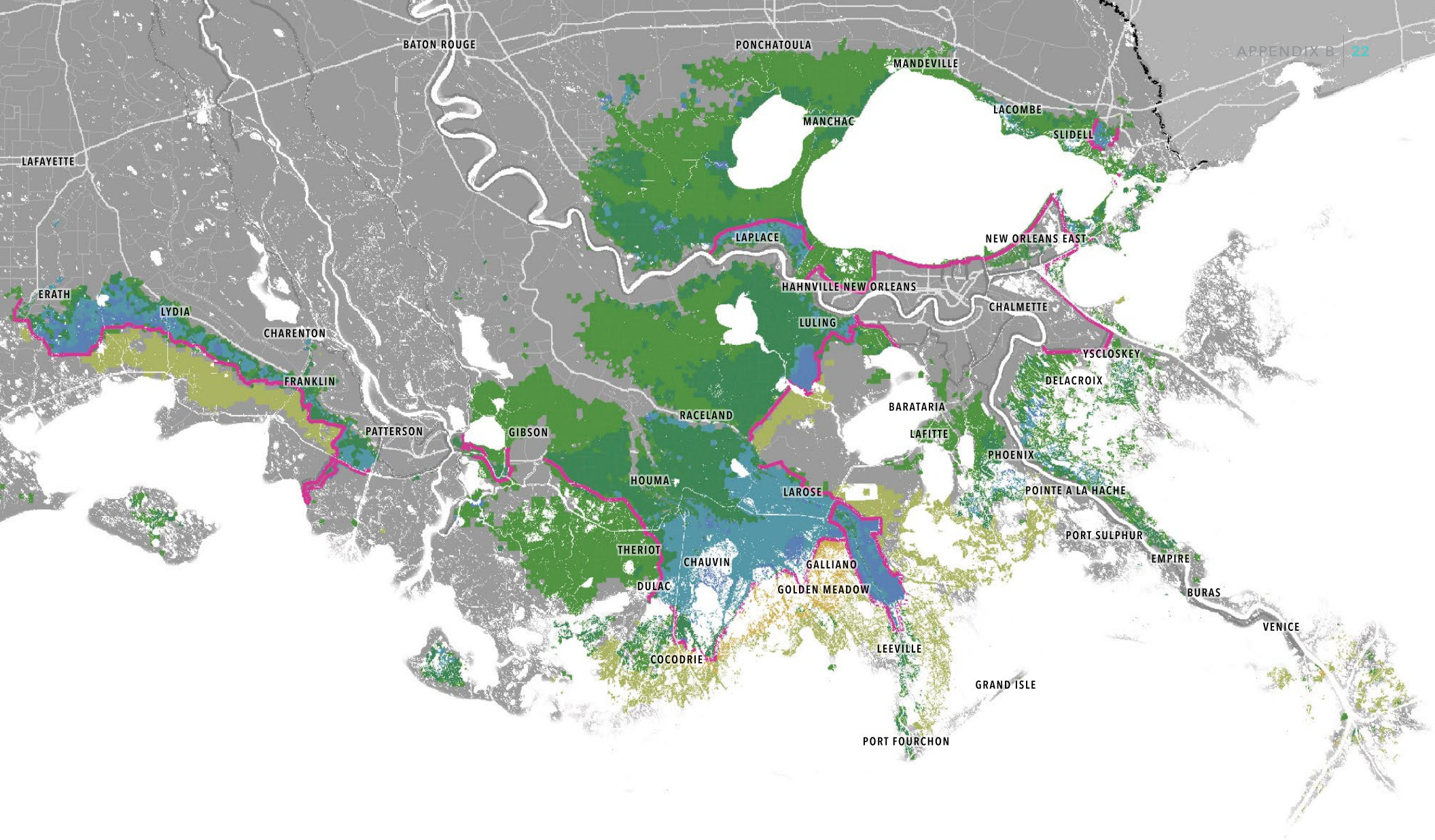


FIGURE 10. CHANGES IN FLOOD RISK

This map shows how the structural protection and restoration projects in the master plan would reduce flooding in 50 years compared to flooding that would occur in 50 years if we took no action. Note: uncolored areas on the map will still face flooding risks. These risks will vary depending on the locale. Nonstructural projects (i.e. raising homes, floodproofing, and voluntary acquisition) will be the primary method for helping people deal with flooding in those areas. To see an estimate of your flood risk, use our Master Plan Data Viewer: cims.coastal.louisiana.gov/masterplan. The viewer allows you to see your flood risk with and without master plan projects.



LESS FLOODING — MORE FLOODING

< -9′ | -9′ TO -6′ | -6′ TO -3′ | -3′ TO -1′ | 1′ TO 3′ | > 3′

STRUCTURAL RISK REDUCTION PROJECTS

CHANGES IN FLOOD RISK
IN 50 YEARS

ECONOMIC DAMAGE
IN 50 YEARS

$8.3B
REDUCTION

DIVERSE TOOLS REDUCE RISK

The flood protection measures in the master plan will reduce risks for residents and provide more certainty for businesses and industries. Many of these measures are related not to levees, which are extremely expensive and take decades to build, but to what are called nonstructural measures. These include things such as elevating homes, floodproofing businesses, and supporting homeowners if they wish to move out of harm's way. Although they can be put into place more quickly and inexpensively than levees, nonstructural measures do require that residents be active partners in making their homes and businesses safe from flooding.

By using a combination of structural and nonstructural risk reduction projects, we estimate that we can reduce the expected annual damage from storm surge by more than 75% for the following regions: Houma, Slidell, Franklin and Charenton, Edgard, Kenner and Metairie, lower St. Mary, Prairieville and Sorrento. We estimate that we can reduce expected annual damage by more than 90% for these regions: Garyville, Ama, Laplace and Reserve, Algiers, Hahnville and Luling, Montz, Donaldsonville, Convent, Vacherie, Larose and Golden Meadow, Morgan City, Abbeville and Delcambre, and Iberia. Looking long-term, we estimate that the master plan's risk reduction projects can reduce expected annual damage coast wide by $150 billion over 50 years.

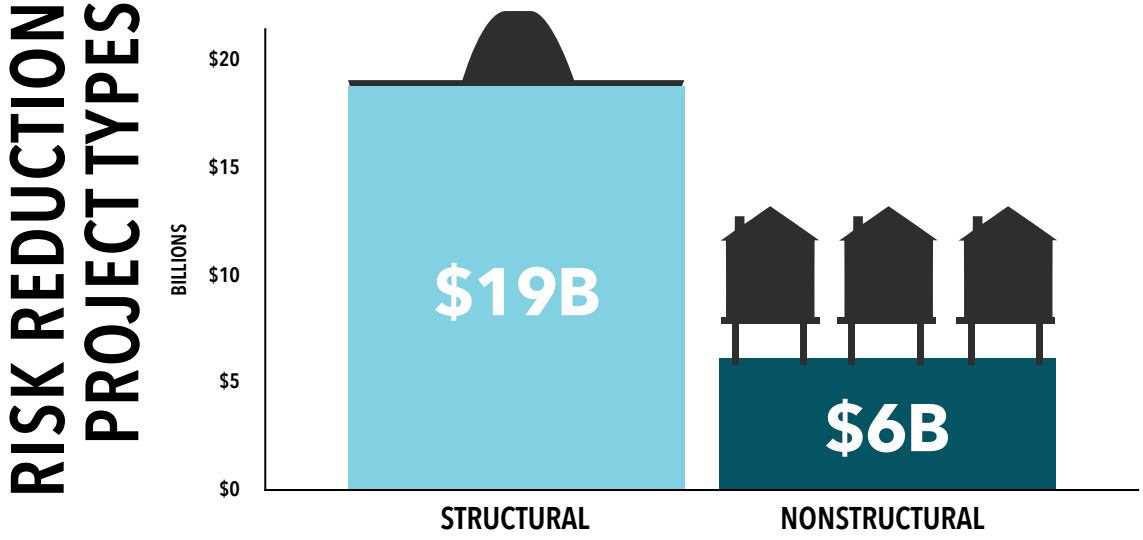


FIGURE 11. ECONOMIC DAMAGE

Expected annual damage is an estimated average of a community's likely flood risk from a serious flood and the damage to property associated with that risk. This factor takes into account that floods are unpredictable; sometimes they don't occur for years, and sometimes they occur several years in a row. We estimate that the master plan's flood risk reduction projects will save more than $8.3 billion in annual economic damage by Year 50 and are expected to pay for themselves three times, over the course of implementing the plan.

FIGURE 12. RISK REDUCTION PROJECTS

The 2017 Coastal Master Plan uses both structural and nonstructural projects to reduce flood risk, at a projected total cost of $25 billion. Levees are structural projects. Nonstructural projects include other options, such as elevating homes and floodproofing.

Flood in Old Mandeville. Photo courtesy of Tobin Fricke.

PARISH LEADERS AND HOMEOWNERS CAN USE THESE RECOMMENDATIONS AS STARTING POINTS FOR THINKING ABOUT HOW TO REDUCE RISK FOR COMMUNITIES.

Elevated homes in Shell Beach. Photo courtesy of Louisiana Sea Grant.

RAISING HOMES, RAISING HOPES

To help communities face rising water using nonstructural means, CPRA has developed a Flood Risk and Resilience Program. In support of this program, the 2017 Coastal Master Plan provides high-level estimates about what could be achieved. The plan highlights areas where structures could be elevated or floodproofed, as well as areas where homeowners are struggling with high flood depths and may want to consider moving to higher ground. The master plan also includes estimates about the money these measures would cost and how long the work would take.

Although the master plan refers to these estimates as "projects," they are not projects in the traditional sense. Instead the estimates are recommendations for ways to make people and property safer, without using levees. Parish leaders, floodplain managers, and state agencies like the Governor's Office of Homeland Security and Emergency Preparedness and the Office of Community Development can use these nonstructural recommendations as starting points for thinking about how to reduce risk for communities in highly vulnerable areas.

Ultimately, the projects will be adopted at the local level based on parish plans, homeowner interest, available funding, and other local circumstances. To help communities make these decisions, CPRA will share what we learned in our nonstructural analysis. We can supply information about present day and future flood risks. We also have estimates of how many structures could be floodproofed, elevated, or acquired to provide the most value for different areas of the coast. Finally, we can share projected costs for these estimates.

With this information in hand, parishes will need to determine which structures to work on first. CPRA's criteria for prioritizing nonstructural action are listed below in order of importance:

1. structures benefiting low to moderate income households,
2. structures that are owner occupied/primary residences,
3. structures that are next to a building or buildings that are already being mitigated through the nonstructural program,
4. structures with the highest flood depths.

Once the pool of possible projects has been narrowed using the above criteria, parishes may consider other factors, such as whether properties have experienced repetitive or severe flood losses.

CPRA will work with local officials to create nonstructural proposals that meet requirements for funding. CPRA's Flood Risk and Resilience Program is entirely voluntary — residents are in no way forced to make immediate decisions and can opt in or out of the program as they wish.

BREAKING NEW GROUND NATIONALLY

Louisiana's Flood Risk and Resilience Program is the first nonstructural program in the nation to propose work on such a large scale; the master plan offers recommendations that could affect up to 26,000 structures coast wide. The plan recommends three kinds of measures (also called "mitigation").

Floodproofing: Makes buildings more watertight up to an established elevation. This option is recommended for structures that are too large to be elevated, such as businesses, public buildings, or apartment buildings.

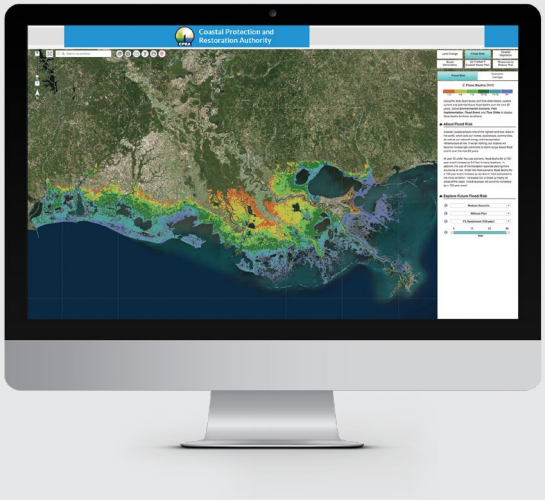
Elevation: Helps make people and property safer by elevating residential structures to CPRA's projected 100-year flood depths (above grade) plus two feet.

Voluntary acquisition: Refers to the voluntary sale of a piece or pieces of property located in a floodplain. Voluntary acquisitions can take place when residents decide that their homes are too flood prone to keep using.

WANT MORE INFO?

For more information on how nonstructural measures work, visit our Master Plan Data Viewer: cims.coastal.louisiana.gov/masterplan. Type in your address and customize your search using the menu on the right. You can click on "Resources to Reduce Risk" for information about nonstructural options. The viewer offers many other options for learning about flood risk and how to prepare for it.

For a more technical overview of CPRA's Flood Risk and Resilience Program, see Appendix E. For a list of Frequently Asked Questions, see: coastal.la.gov.



Master Plan Data Viewer

FIGURE 13. RANGE OF NONRESIDENTIAL FLOODPROOFING COUNTS

The range of nonresidential floodproofing counts the master plan recommends to reduce risk. Nonstructural project areas are marked in shades of blue and green.

FIGURE 14. RANGE OF RESIDENTIAL ELEVATION COUNTS

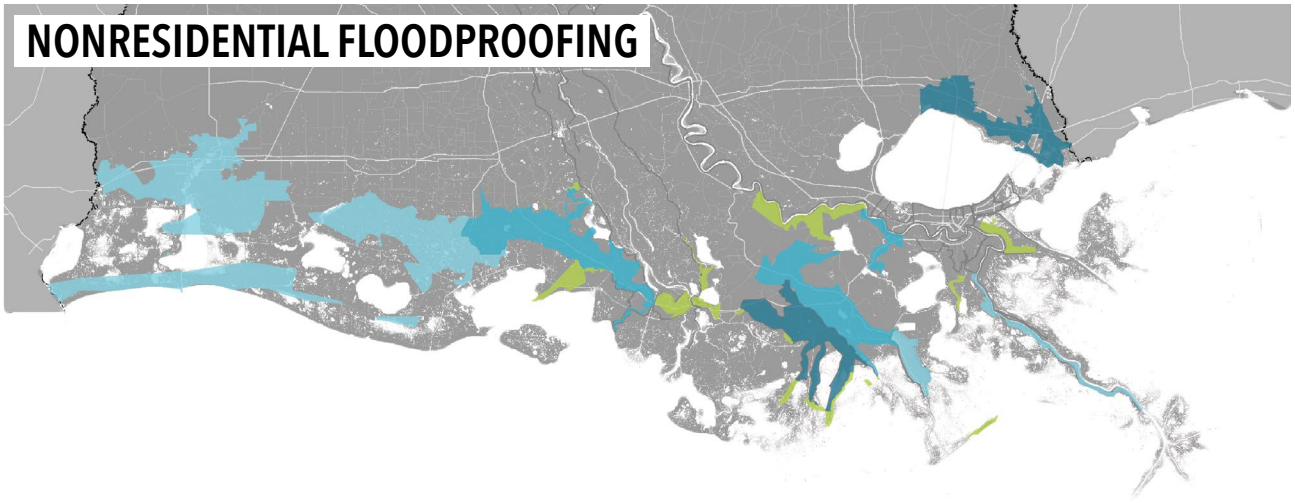
The range of residential elevation counts the master plan recommends to reduce risk. Nonstructural project areas are marked in shades of blue and green.

FIGURE 15. RANGE OF RESIDENTIAL VOLUNTARY ACQUISITION COUNTS

The range of residential voluntary acquisition counts the master plan recommends to reduce risk. Nonstructural project areas are marked in shades of blue and green.

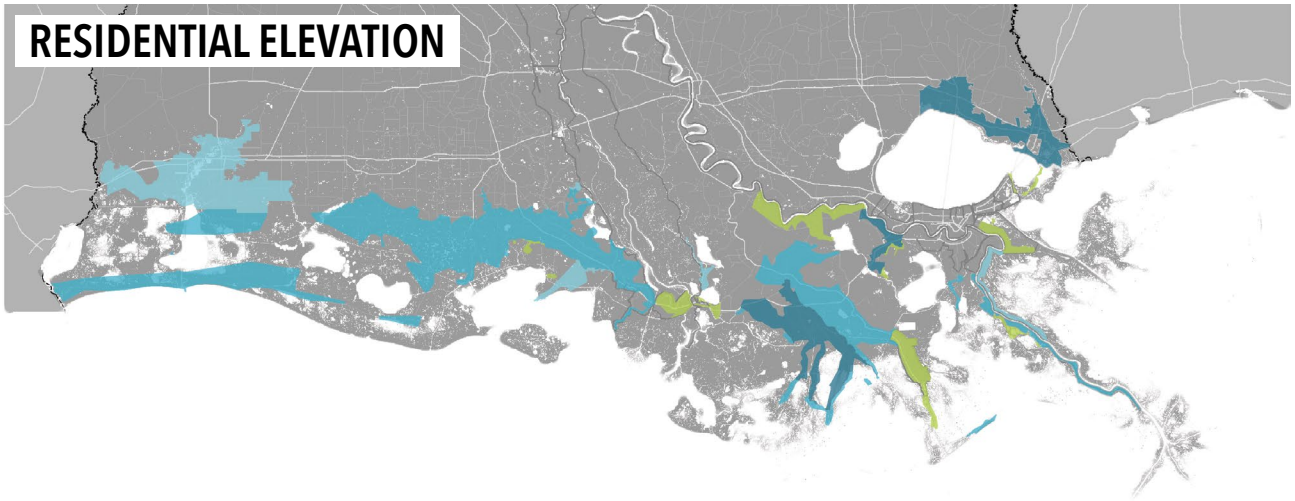
About the Master Plan Data Viewer (left): People's number one question about the coast is, "How bad is flooding going to get?" To answer this question, we created the Master Plan Data Viewer. The viewer is an interactive program that allows people to go online, type in a location, and learn how likely that place is to flood. People can also see estimated damages from flooding, as well as estimates of how flood risk would change as master plan projects are constructed. See: cims.coastal.louisiana.gov/masterplan.

NONRESIDENTIAL FLOODPROOFING



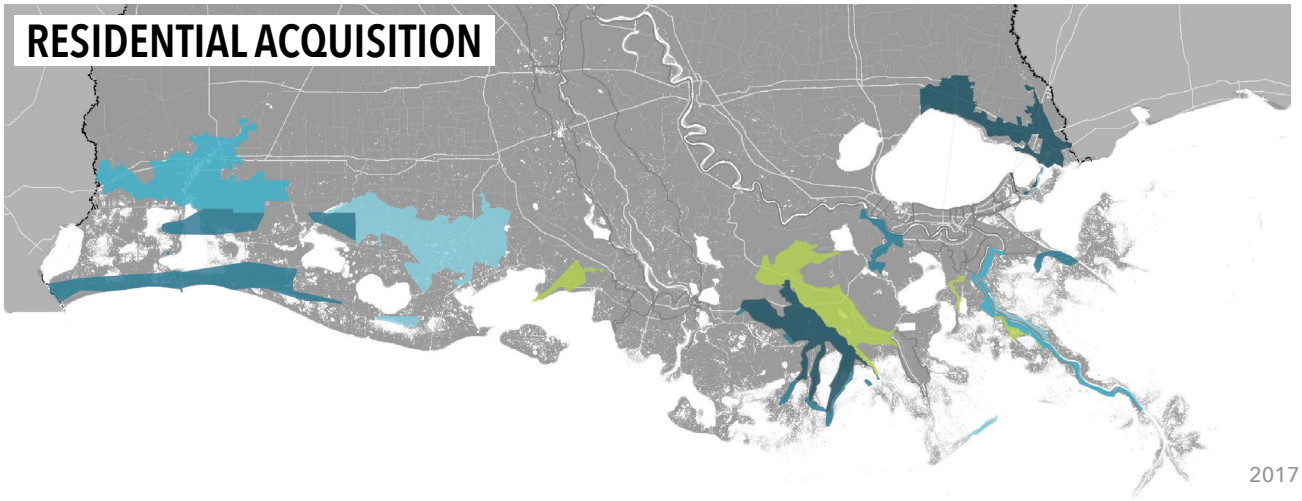
OF SOLUTIONS:
- 1 - 10
- 11 - 50
- 51 - 150
- 151 - 375

RESIDENTIAL ELEVATION



OF SOLUTIONS:
- 1 - 50
- 51 - 250
- 251 - 2000
- 2001 - 5307

RESIDENTIAL ACQUISITION



OF SOLUTIONS:
- 1 - 10
- 11 - 50
- 51 - 100
- 101 - 200
- 201 - 889

OTHER PLAN BENEFITS

MODELS AND METRICS

When the Louisiana Legislature passed Act 8, it created CPRA, and it charged us with using the best available science to protect and restore the coast. This mandate led us to develop computer models that help us understand how coastal projects might work in the real world. (See Ch. 3 of the master plan for more details on the models.) We used the modeling results to inform our choice of master plan projects.

We wanted the master plan to reflect things that are important to the way we live in south Louisiana. So we also evaluated how the master plan's recommendations would mesh with the following factors, or metrics. Based on our analysis, we can make the following predictions:

- **Support for Traditional Fishing Communities.** Master plan benefits for the communities of Dulac, Isle de Jean Charles, Chauvin, Pointe Aux Chenes, Larose/Cut Off/ Galliano/Golden Meadow, Belle Chasse, Empire, Port Sulphur, Buras, and Venice. These benefits include reducing expected annual damage and improving habitats for the fish that each community has historically caught and consumed.
- **Support for Oil and Gas Activities and Communities.** The master plan helps communities whose residents work for the oil and gas sector, as well as communities where oil and gas infrastructure is located. Under the master plan, expected annual damage in those communities is reduced and more land is maintained than if we take no further action.
- **Support for Agricultural Communities.** The master plan helps Larose/Cut Off/Galliano/ Golden Meadow, Houma, Raceland, Pecan Island, Luling/Boutte, Hahnville, and Franklin. These communities see reduced flooding and expected annual damage, making it easier to maintain appropriate salinities in agricultural areas.
- **Flood Protection of Historic Properties.** The master plan reduces flooding by 33% for properties that are registered with the National Register of Historic Places and are subject to flooding from a 50-year storm.
- **Flood Protection of Strategic Assets.** The master plan reduces flooding by 28% for strategic assets that are subject to flooding from a 50-year storm event.
- **Social Vulnerability.** The master plan does not disproportionately affect communities identified as vulnerable, whether that vulnerability is based on income levels; where people live (rural or urban); whether residents are very young, elderly, or non-English speaking; or whether people depend on a single natural resource for employment or sustenance.

Marsh Maneuvers student takes a break from revegetating shorelines with wetland grasses. Photo courtesy of Louisiana Sea Grant.

PEOPLE AND THE MASTER PLAN

We are at a point in south Louisiana where life as we know it is changing. The projects in the master plan reflect that truth. We cannot keep the landscape the way it is today, nor can we keep flood risks from rising along with sea levels. But the master plan's projects also make the most of our region's assets: our rivers deliver wetland building sediment, we are receiving funds from a variety of sources to help us begin crucial projects, and perhaps most important, we have a beloved way of life that we want future generations to enjoy. Taken together, these challenges and assets provide us with the incentives and the opportunity to begin a new chapter in coastal Louisiana.

SECTION THREE

OPPORTUNITIES FOR OUR WORKING COAST

- NEW JOBS FOR A WORKING COAST
- OUR NATION'S SOUTHERN GATEWAY
- VALUING A NATIONAL TREASURE
- BRINGING IT ALL BACK HOME

Debris removal on Calcasieu Lake. Photo courtesy of Louisiana Sea Grant.

WHAT MAKES A WORKING COAST

Our coast defies tidy categories. It's not just a three million acre conservation area, nor is it an industrialized zone bereft of natural habitats and vibrant communities. Somehow, south Louisiana manages to be many things at once: a center of culture, a haven for wildlife, and an economic hub of national importance. These roles might seem mutually exclusive, and in most other places they probably would be. But in south Louisiana we make these different roles work together, all while delivering a wealth of goods and services to our state and nation. This is the value of Louisiana's Working Coast.

It's true that sea level rise, subsidence, and other challenges threaten our communities. But unlike places that face similar problems—the Outer Banks of North Carolina, New York City, and Miami, to name just a few—we have the Mississippi and Atchafalaya Rivers. By supplying sediment and water, these rivers will help us fight encroaching seas in ways that other low-lying regions can't duplicate.

Stepping back from individual strategies and looking at our overall response to coastal change, we have become national leaders. The framework our state established after Hurricane Katrina, in which residents, researchers, and the state figure out how to save our coast through the master planning process, is already being used as a model for handling climate change in other regions of the U.S. and the world.

One of the benefits of being out in front is that leadership in one area helps spur innovation in others. We're already seeing this trend, as green businesses and industries continue to invest in south Louisiana. A 2011 report by the Louisiana Workforce Commission found that Louisiana's economy could create up to 100,000 green sector jobs by 2020, with particularly fast growing sectors in utilities and manufacturing. This new investment, which is coming from entrepreneurs throughout the world, bodes well for our future.

FOR HUNDREDS OF YEARS, LOUISIANA HAS SERVED AS A GATEWAY FOR INNOVATION, CONNECTING THE MIDWEST TO THE WORLD, AND GENERATING IDEAS AS DIVERSE AS THE BINOCULAR MICROSCOPE AND JAZZ. LOUISIANA IS POISED TO REPRISE THIS ROLE IN A NEW CENTURY, AS THE CHALLENGES WE FACE SPUR US TO TAKE THE LEAD IN COASTAL ADAPTATION.

30,350

EMPLOYED WATER MANAGEMENT JOBS IN THE NEW ORLEANS REGION

9,500

NEW WATER MGMT JOBS SINCE 2010

23% GROWTH

13,600

PROJECTED WATER MANAGEMENT JOB OPENINGS OVER THE NEXT 10 YEARS

24,200

JOB OPENINGS FOR OCCUPATIONS IN BOTH WATER MGMT AND ENERGY IN 2025

2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

FUTURE COASTAL RESTORATION SPENDING

JOBS SUPPORTED WITH A $25B INVESTMENT:

10 YEARS	50 YEARS
57,697	77,453

FIGURE 16. WATER MANAGEMENT JOBS

Coastal projects create spin-off jobs in other fields. Our water rich state is becoming a laboratory for investigating how people can most effectively handle floods and promote water quality. The Water Campus in Baton Rouge will attract thousands of researchers interested in exploring the links among land, water, and people.

NEW JOBS FOR A WORKING COAST

RESTORING AND PROTECTING THE COAST CREATES JOBS

Building the projects in the master plan will be labor intensive, and that is good news for Louisiana workers. Accounting for both direct and indirect impacts, a Louisiana Workforce Commission report estimates that state coastal spending in future years could translate into roughly 5,500-10,300 jobs, $270-$520 million in wages, and $720-$1.35 billion in sales each year. In addition, there is a good match between the skills that this work demands and the skills of many south Louisiana workers who have experience in the energy sector.

The economic benefits are not limited to those created by state coastal projects. Louisiana's investment in coastal research has spurred the growth of related fields. For example, learning to live with water is central to our wetland restoration and flood risk reduction strategies. The state's interest in this subject has created a welcoming business climate for water managers who can help communities reduce flooding and improve water quality.

The City of New Orleans has already made major investments in this sector, and other cities and towns in south Louisiana are seeking to follow suit. As a result, water management jobs are projected to grow 23% over the next 10 years, providing 13,000 job openings in the Greater New Orleans region alone. Since 2010, 9,500 water management positions have been created in south Louisiana—a time when many people have been laid off from jobs related to oil and gas production. Of the new jobs created, most are positions in construction, engineering, surveying, design, operations, and planning.

Protecting and restoring south Louisiana's coast makes sense on its own merits. But action at the scale recommended in the master plan will do more than defend our way of life. By rebuilding wetlands and protecting communities from flooding, we can create new jobs, spur sectors of innovation, and strengthen our state economy.

OUR NATION'S SOUTHERN GATEWAY

NAVIGATION RUNS DEEP

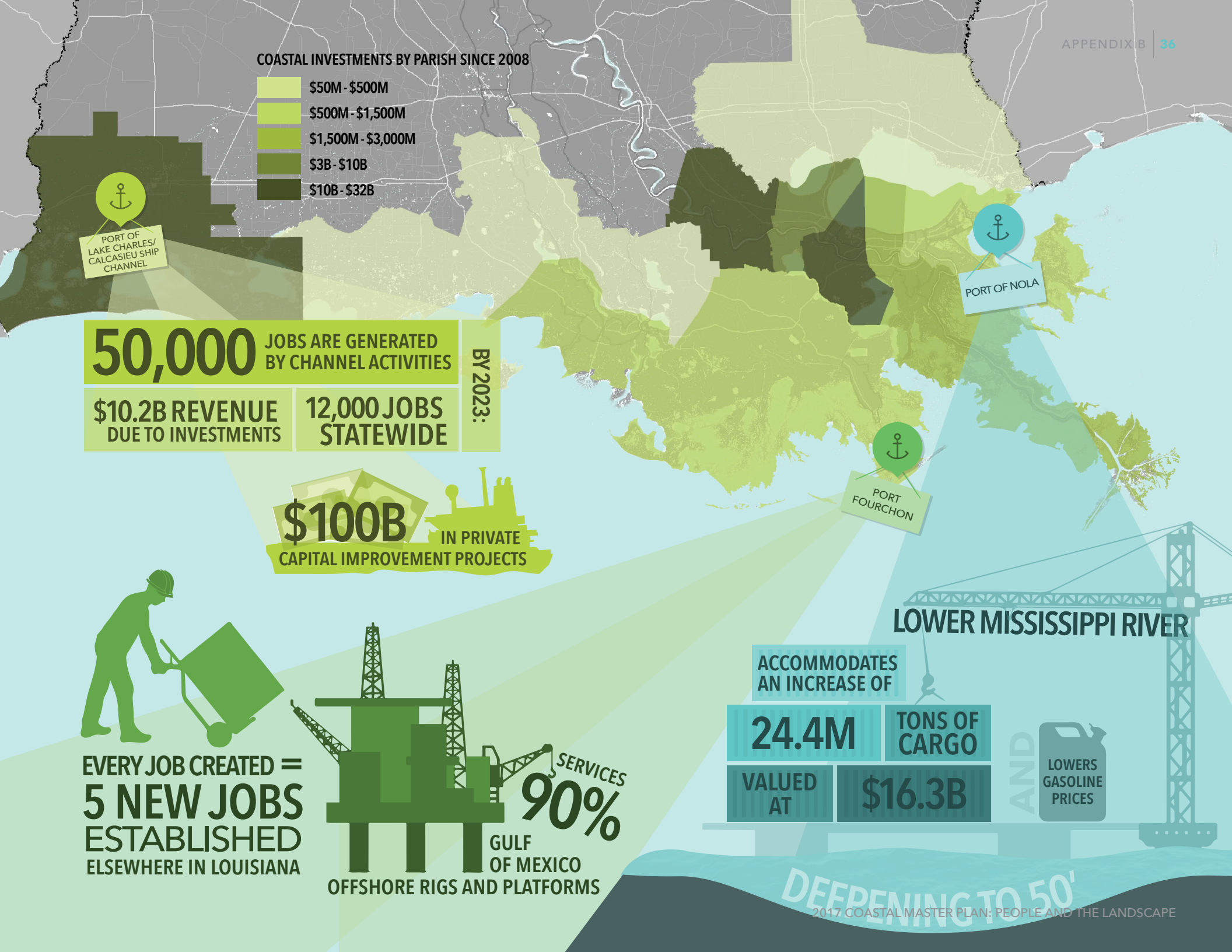
The unique geography of south Louisiana makes it ideally suited to speed the flow of goods between inland U.S. ports and international markets. We have long changed the course of water to provide this service, from the early days of Mississippi River trading posts to present day adaptations for post-Panamax ships. In the 21st Century, it's clearer than ever that trade and our restored coast are linked.

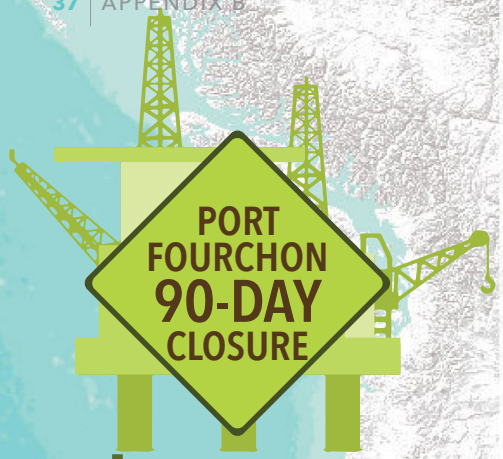
- According to a study commissioned by the Lake Charles Harbor and Terminal District in 2015, nearly half of the Lake Charles metro area's economy depends on the Calcasieu Ship Channel. Today, the channel has helped create 36,000 jobs. New liquefied natural gas facilities were sited in southwest Louisiana, in part because of the channel's access to the Gulf of Mexico. These facilities are forecast to create 12,000 jobs and increase local revenue by nearly 80% or up to $10.2 billion by 2023. Since 2012, nearly $100 billion in capital improvement projects have been announced for Cameron and Calcasieu Parishes.
- Port Fourchon provided almost $2.6 billion in sales for Louisiana firms in 2013. This translated into $580 million in household earnings for state residents. Louisiana jobs directly related to the port total 10,804, and for every new job created at Port Fourchon, five new jobs are created elsewhere in the state.
- Port Fourchon services about 90% of all deepwater offshore rigs and platforms in the Gulf of Mexico. The port also services nearly half of all shallow-water rigs and platforms in the region. Together, these rigs produce almost 20% of the nation's oil supply, making Port Fourchon indispensable to our national energy security. A 90-day closure of Port Fourchon would cost the U.S. economy $11 billion in sales, $3 billion in household earnings, and millions of barrels of oil and billion cubic feet of gas.
- Maritime activity associated with the Port of New Orleans accounts for 160,500 jobs in Louisiana and spurs $8 million in earnings. Officials estimate that 380,000 jobs depend on cargo handled by the port. In addition, the port provides a $37 billion impact to the nation's economy.
- Between 2017 and 2024, the Port of New Orleans is deepening the Lower Mississippi channel to accommodate new Post-Panamax super ships. By 2024, the process will be complete, and the nation as a whole will see billions in direct benefits.
- Louisiana port and vessel services create or support almost 475,000 jobs in Louisiana, or about a quarter of the state's total.

FIGURE 17. INVESTING IN OUR COASTAL ECONOMY

Three major port systems in south Louisiana function as pillars of the national economy: the Port of New Orleans, Port Fourchon, and the Port of Lake Charles/ Calcasieu Ship Channel. Together, with the Port of South Louisiana, which extends into St. James and St. John the Baptist Parishes, these ports process the mainstays of the U.S. economy, from grain shipments to oil, gas, and other products.

EACH YEAR, LOUISIANA'S WORKING COAST SENDS OVER $120 BILLION IN GOODS AND SERVICES TO THE REST OF THE UNITED STATES. AN ADDITIONAL $36.2 BILLION IS EXPORTED INTERNATIONALLY.


COASTAL INVESTMENTS BY PARISH SINCE 2008
$50M - $500M
$500M - $1,500M
$1,500M - $3,000M
$3B - $10B
$10B - $32B
PORT OF LAKE CHARLES/ CALCASIEU SHIP CHANNEL
PORT OF NOLA
PORT FOURCHON
50,000 JOBS ARE GENERATED BY CHANNEL ACTIVITIES
$10.2B REVENUE DUE TO INVESTMENTS
12,000 JOBS STATEWIDE
BY 2023:
$100B IN PRIVATE CAPITAL IMPROVEMENT PROJECTS
EVERY JOB CREATED = 5 NEW JOBS ESTABLISHED ELSEWHERE IN LOUISIANA
90% SERVICES GULF OF MEXICO OFFSHORE RIGS AND PLATFORMS
LOWER MISSISSIPPI RIVER
ACCOMMODATES AN INCREASE OF
24.4M TONS OF CARGO
VALUED AT $16.3B
AND
LOWERS GASOLINE PRICES
DEEPENING TO 50'



$7.8B
GROSS DOMESTIC PRODUCT
REDUCTION
NATIONWIDE

18%
OF THE UNITED STATES
OIL SUPPLY
DEPENDS ON PORT FOURCHON

EACH YEAR **11,000 VESSELS**
USE THE LOWER MISSISSIPPI RIVER

60%
OF THE NATION'S GRAIN IS SHIPPED VIA THE LOWER MISSISSIPPI RIVER

U.S. JOBS DEPENDENT ON CARGO HANDLED BY THE PORT OF NEW ORLEANS:

380,000

ECONOMIC IMPACT: **$37B**

500M TONS
OF CARGO MOVE ANNUALLY ON THE LOWER MISSISSIPPI RIVER TO PORTS IN LATIN AMERICA, THE CARIBBEAN, EUROPE, ASIA, AND AFRICA

FIGURE 18. NATIONAL SIGNIFICANCE

Together, the coast and the Mississippi River make a powerhouse that creates billions in economic value. Louisiana's wetlands protect valuable infrastructure from storm surge and flooding. These include oil and gas pipelines, the Strategic Petroleum Reserve, and the Henry Hub, a national distribution point for natural gas. The Mississippi River and related ports and navigation channels provide the conduits for sending goods north to U.S. producers or south to international markets.

FIGURE 19. FISH AND SHELLFISH

In 2015, Louisiana had the second highest commercial fish landings in the United States (just over 1 billion pounds). This abundance is only possible because coastal wetlands provide critical habitat for these species.

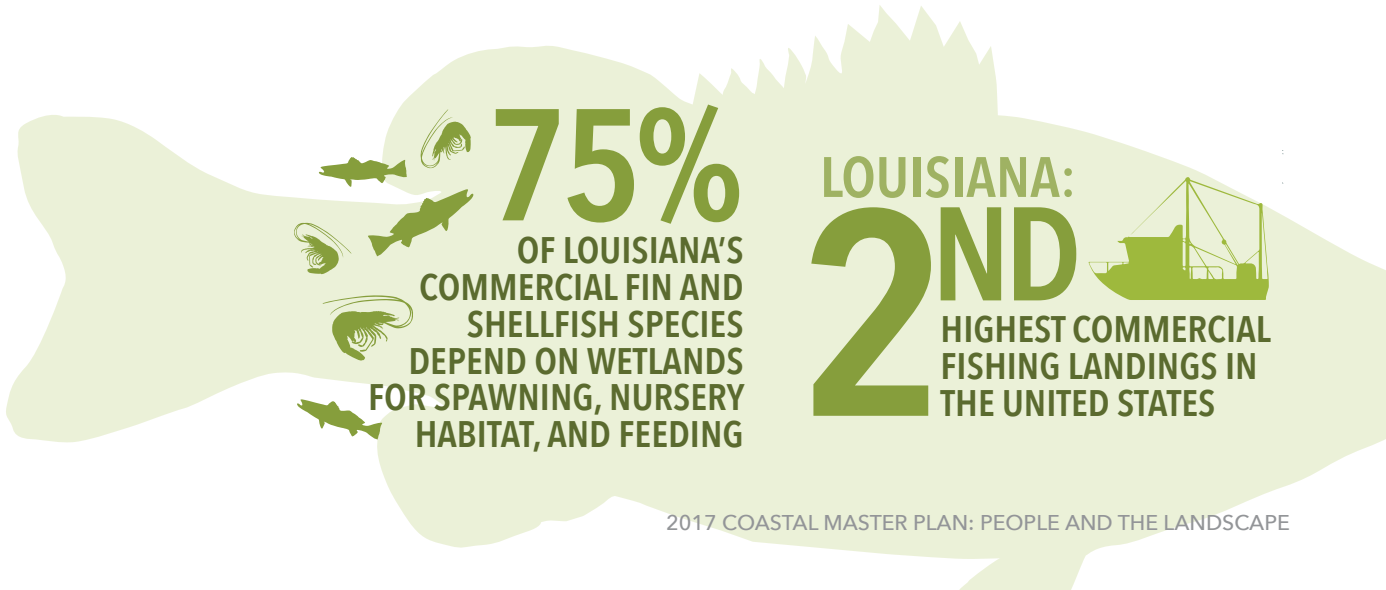
VALUING A NATIONAL TREASURE

OUR COAST SUPPORTS THE NATION

Ports, natural habitat, protection for energy infrastructure—many studies describe what the coast provides. What sets our statistics apart from standard economic boosterism? For one thing, our numbers tend to underplay what south Louisiana offers. There aren't always clear cut ways to measure every benefit. In addition, when assessing the value of our highly managed, intensively used landscape, we have to examine everything from the economic output of oil and gas pipelines to the value of providing habitat for five million waterfowl. Doing so is complicated and tends to undervalue the combined effect of having so many different assets in a single region.

Experts have tried various ways to put a value on the coast's abundance, more in the spirit of highlighting the incredible gifts of our landscape than out of certainty that these gifts can be perfectly captured in numbers. One of the ways researchers assign value to natural systems is by considering what are known as ecosystem services, meaning the benefits that the environment provides to people. In Louisiana, these benefits range from oyster and shrimp habitats, to flood reduction, to nature based tourism.

In 2010, seven independent researchers examined the coast's provision of ecosystem services. Their report, published by Earth Economics, stated that the Mississippi River Delta provides at least $12-$47 billion in benefits to people each year. If this natural capital were treated like an economic asset, its value would be $330 billion to $1.3 trillion per year. Over a 100-year period, the value of the coast's ecological services alone would be between $237 billion and $4.7 trillion. The researchers note that many data gaps remain in our understanding of what the coast provides. As we learn more, our appreciation for the coast's value will grow. In the meantime, what we know today makes a compelling case for action.



BRINGING IT ALL BACK HOME

CONCLUSION

What we do or don't do in the next two decades will determine our coast's long-term future. The decisions are not easy. Some of us will have to change our homes and businesses. Others may have to consider bigger changes, even leaving cherished communities. But these decisions are ours to make together.

Can we keep listening, talking, and learning from each other about the best way to proceed? So far, the people of south Louisiana have said yes, they can. This willingness gives great cause for hope.

In view of rising seas and the migration of people away from Louisiana's southernmost regions, some have asked, "Why not just give up on Louisiana's coast?" The answer is simple: our combination of resources and geography is found nowhere else on earth. Louisiana's Mississippi River Delta and Chenier Plain contain vast wetland habitats that are already worth celebrating and protecting. That the same region also provides billions in economic value makes our coast indispensable.

And in fact, the region is growing and jobs are being created because the country needs what flows from Louisiana's coast. The transportation and energy hubs cannot be duplicated anywhere else, nor could our world renowned culture. Our efforts to sustain these assets through science based planning has, in turn, spurred new cycles of investment and innovation. As long as people need what our coast gives, and they appear to need it more than ever, we will be here in south Louisiana making the Working Coast our home.

We all have a stake in protecting and restoring our Sportsman's Paradise. Photo courtesy of Jim Noetzel.

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